13MCA52

USN

Fifth Semester MCA Degree Examination, Dec.2015/Jan.2016
System Simulation & Modeling

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions.*

1   a.   Define simulation. Explain the advantages and disadvantages of simulation.   (10 Marks)
    b.   Explain the steps in a simulation study with a neat diagram.   (10 Marks)

2   a.   A production firm manufactures computer chips on the average at 2% nonconforming. A random sample of size 50 is taken from the process. If the sample contains more than two non conforming chips, the production process will be stopped. Compute the probability that the production process will not be stopped.   (08 Marks)
    b.   Give the definitions for a discrete Random variable and a continuous random variable.   (04 Marks)
    c.   Give one example each for a discrete distribution and a continuous distribution.   (08 Marks)

3   a.   Explain the linear congruential method of generating random numbers.   (04 Marks)
    b.   Generate a sequence of 5 random numbers with the help of linear congruential method with the seed value $X_0 = 28$, the multiplier a = 17, the increment C = 43 and modulus m = 100.

Random numbers between 0 and 1 can be generated by $R_i = \dfrac{X_i}{m}$, i = 1, 2, ...   (10 Marks)

    c.   Explain how a chi-square test is used to test the random numbers.   (06 Marks)

4   a.   Explain the characteristics of queueing systems.   (12 Marks)
    b.   Explain the queueing notation for parallel server system.   (08 Marks)

5   a.   The interarrival times and service times of customers in a single channel queueing systems are as follows:

Customer	1	2	3	4	5	6	7	8	9	10
Inter Arrival Time (mins)	-	1	2	4	5	7	3	5	6	2
Service Time (mins)	4	2	3	1	3	4	5	2	2	4

Calculate
        i)   Probability of idle server   (08 Marks)
        ii) Average service time.   (08 Marks)
    b.   Explain the event scheduling algorithm and list processing operations.   (08 Marks)
    c.   Explain a single server queue simulation in Java.   (04 Marks)

6   a.   Explain the four steps in the development of a useful model of input data.   (10 Marks)
    b.   Explain the process of identifying the distribution of data using histograms.   (10 Marks)

7   a.   Define validation and calibration of a simulation model. Explain the iterative process of calibrating a model with a neat diagram.   (08 Marks)
    b.   Explain the three step approach by Naylor and Finger for the validation process of a simulation model.   (12 Marks)

8   a.   Explain the point estimation and confidence interval estimation of a performance parameter.   (10 Marks)
    b.   Explain briefly about the output analysis for steady state simulation.   (10 Marks)

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